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Impact of Insecure Land Tenure on Sustainable Agricultural Development: A Case Study of Agricultural Lands in the Republic of Benin, West Africa

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Abstract: This study assesses the impact of insecure land tenure on sustainable agricultural development in Africa to demonstrate how the economic profitability of agriculture strongly depends on land tenure security. The Republic of Benin is used as the case study following the country's recent enactment of land law 2013-01 that focuses on reorganizing the land sector, which has suffered from inappropriate management since the colonial era. Through an interview survey among landowners and presumed owners combined with standardized observations in designated rural areas, issues related to the use and management of rural lands in the Republic of Benin are highlighted and discussed. The result demonstrates that agricultural economic profitability strongly depends on land tenure security. The outcome reveals land security as a key factor for sustainable agriculture toward poverty reduction and confirms the unbreakable link between land tenure security, agricultural production, and sustainable development.

Keywords: land law 2013-01; agricultural land; insecure land tenure; land tenure security; sustainable agriculture; profitability; Republic of Benin

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1. Introduction

Various studies focus on the goals of sustainable agriculture among which producing food, maintaining the economic stability of farms, and helping farmers improve their techniques and quality of life are major concerns. However, sustainable agriculture also focuses on ensuring long-term production with minimal effects on the environment. In this regard, Margaret Cunningham (2016) [1] states that sustainable agriculture tries to find a good balance between the need for food production and the preservation of the ecological system within the environment. Moreover, the Food and Agriculture Organization (FAO) defines sustainable agricultural development (FAO Report, 2017) [2] as "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such development conserves land, water, plant, and animal genetic resources are environmentally non-degrading, technically appropriate, economically viable, and socially acceptable".

In 2010, a study was jointly conducted by the African Union Commission, the African Development Bank, and the Economic Commission for Africa titled "Framework and Guidelines on Land Policy in Africa" [3]. The report revealed the agricultural sector's contribution to the Gross Domestic Product (GDP) in most countries in sub-Saharan Africa. Accordingly, the above contribution exceeds 25% and is as high as over 40% in countries such as the Central African Republic, the Democratic Republic of Congo, Ethiopia, Guinea-Bissau, Rwanda, Sierra Leone, and Tanzania.

Western African countries are not excluded. Indeed, investigations were conducted on land use trends in countries that have had similar experiences of land usage as Benin over 38 years (1975–2013). In Benin, agricultural areas progressed from 9.2% to 27.1% of the total country area, increasing by over 5% per year. Burkina Faso's land cover experienced a major cropland expansion between 1975, where 82.5% of the land was still covered by natural land cover classes, and 2013, where only 57.4% of the country's land was occupied by these land cover classes. Burkina Faso's land area covered by rainfed agriculture increased from 41,130 sq km (15%) in 1975 to 106,938 sq km (39%) of the total land area (274,200 sq km). In Côte d'Ivoire, the population growth induced dramatic changes in land use and land cover; the most striking is the net increase of 84% (31,600 sq km) of agricultural lands. In Niger, agricultural land areas experience a 94% increase while in Senegal, agricultural land area increased from 32,600 sq km in 1975 to 32,900 sq km in 2000 and 41,000 sq km in 2013, making it an overall 26% increase between 1975 and 2013. In Ghana, from 1975 to 2000, agricultural lands expanded from 13% to 28% of Ghana's total area, and recently, between 2000 and 2013, agriculture expanded more rapidly reaching 32% of Ghana's land area. As for Nigeria, home to the largest population in the region and the largest area under cultivation, agricultural land drastically increased from 184,754 sq km (20% of Nigeria's land area: 923,768 sq km) in 1975 to 380,000 sq km (40% of the total land area) in 2013. Overall, the population in West Africa was 400 million in 2020 and is expected to exceed 600 million by 2030. Over the last 20 years, increases in agricultural production have generally been achieved by putting more land under cultivation, with a 229% increase in farmland accounting for 70% of the growth in regional production (FAO Report, 2017) [2]. Therefore, it is important to prepare for the continuous expansion demand as well as the issue of farmland exploitation to develop sustainable agriculture.

The 43rd seminar of the European Association of Agricultural Economists held at Hague in January 1996, presented the results of interesting ongoing research on decision making and information requirements of farmers. In total, 28 research projects from different groups in 9 countries (from Europe and the US) were reported among which it was demonstrated that large-scale farming tends to be more efficient and productive than small-scale farming. Indeed, the larger the farmland, the higher the productivity. However, a large body of empirical research supports the contention that reaccess to land from wage-operated large farms to family-run small farms would lead to increases in productivity (Barraclough, 1970 [4]; Berry and Cline, 1979 [5]; Kutcher and Scandizzo, 1981 [6]; Barrett, 1996 [7]; Benjamin and Brandt, 2002 [8]; Binswanger, Deininger, and Feder, 1995 [9]). The argument raised is that large farms that rely on hired labor (as opposed to small farms that use family labor) are faced with the cost of supervising hired workers. However, a smaller body of empirical research does not find evidence of this inverse relationship between land size and productivity (Hill, 1972 [10]; Kevane, 1996 [11]; Zaibet and Dunn, 1998 [12]). This minority view has received support from Collier and Dercon (2009) [13], who argue, in the context of African agriculture, that this inverse relationship is supported by only a few studies, with a few others finding a reverse (i.e., positive) farm-size/productivity relationship. It should be noted that most of the earlier research was done to test the main explanation of the inverse relationship, mainly imperfect factor markets-labor, land, and insurance markets (Barrett, Bellemare, and Hou, 2010) [14]. More recent studies that have tested other explanatory factors, especially omitted variables (mainly quality of land) and statistical issues, have confirmed the existence of the inverse relationship (Larson et al., 2012 [15]; Carletto, Savastano, and Zezza, 2013 [16]). These research findings are mainly relevant for indicating the relevant scale for the desired level of productivity; as agriculture is known to play an important role in poverty reduction, food, and nutrition security, the FAO focuses on sustainable agriculture intensification for poverty reduction by promoting sustainable agriculture through agricultural land securitization. Accordingly, in 2017, the FAO published a comprehensive report called "Future of Food and Agriculture" that predicted an increase in the need for global agriculture production to 49% by 2050. However, matching the projected demand will require coping with land security which refers to the right

of individuals and groups of people to effective protection by their government against forcible evictions (Boudreaux, 2009) [17] through good land administration and good land ownership. Nevertheless, land administration and land ownership remain a big challenge in many African countries since attaining independence. Indeed, post-independence African governments have not invested enough in land administration systems, resulting in decaying surveying infrastructures such as national geodetic networks, reliance on outdated large-scale base maps, and provision of inefficient land administration services in many SSA countries. Observers have noted various symptoms of poor land administration (Byamugisha, 2013) [18]. First, even half a century after independence, only 10% of rural land in SSA is registered; the rest is undocumented and thus vulnerable to land grabbing and expropriation without compensation. Second, increased investor interest in large-scale agriculture in SSA has led to "land grabs," to the extent that millions of hectares of land have been claimed by investors, with poor land governance leading to violations of principles of responsible agro-investment and dispossession of local communities (Cotula et al., 2009 [19]; Deininger et al., 2011 [20]). Third, land administration is so inefficient that it takes twice as long (65 days) and costs twice as much (9.4% of property value) to transfer land in SSA than in countries in the Organization for Economic Co-operation and Development (OECD) (31 days; 4.4%) (World Bank, 2012) [21]. Fourth, there is considerable corruption in land administration, as indicated by the FAO and Transparency International in their study of 61 countries. They found that weak governance had increased the likelihood of corruption in land administration (Arial, Fagan, and Zimmermann, 2011) [22]. Fifth, capacity and demand in land administration are low relative to the requirements of countries in other regions. For example, Ghana, Kenya, and Uganda each have fewer than ten professional land surveyors per one million population compared with Malaysia (197) and Sri Lanka (150) (Byamugisha, 2013) [18]. However, in many African countries, colonization resulted in the appropriation of land for white settlers and colonial corporations predominantly in Southern Africa (Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe), Kenya, and Côte d'Ivoire. Just before and immediately after independence from the late 1950s through the 1970s, several of these countries conducted land reforms to redress colonial and post-independence land ownership inequalities and regressive land use policies. The reforms undertaken included the nationalization of settler and corporate lands (as in Angola, Mozambique, and Zambia) and the use of market-based mechanisms for land acquisition and compensation using funds provided by the former colonial masters as agreed to in independence packages (as in Botswana, Kenya, Malawi, Swaziland, and Zimbabwe). Despite these reforms, inequality in land ownership and landlessness are still at unacceptable levels in many countries (Byamugisha, 2013) [18].

Nevertheless, sound land policies and efficient land administration are critical to economic growth, food security, and poverty alleviation, especially in Africa, where about 80% of the population relies on agriculture for their livelihoods (African Development Bank Group Report, 2010) [23]. In fully settled areas where agricultural production increases are no longer feasible through area expansion, enhancing agricultural productivity on existing farms is the only path to agricultural growth. Sound land policies can facilitate growth in agricultural productivity via secure land tenure, which enhances investment opportunities. Sound land policies are also deemed essential for facilitating private investment in agriculture and other land-based industries, including light manufacturing. Although it has long been known that land tenure security is associated with private investment, the recent surges in investor interest in agriculture (following the 2008 food and commodity price boom), oil, mineral resources, and tourism in Africa have put a special premium on land tenure security; without it, investors cannot be sure of reaping the full benefits of land deals and investments, nor can local communities receive protection and full compensation for their land rights or a fair share of returns from investments on their land (Deininger et al., 2011) [20]. Therefore, land tenure security plays an important role in agricultural production. According to Boudreaux (2009) [17], land security refers to the right of individuals and groups of people to effective protection by their government

against forcible evictions. Tenure refers to the status of individuals or groups in relation to the property. Tenure can be freehold, leasehold, conditional, collective, or communal. Land tenure security is an element of property rights: the right to remain on one's land and make use of and profit from that land corresponding to the individual's or group's value (so long as they do not harm others).

Outside of the agriculture sector, land is a constraint for most manufacturing firms in SSA (Dinh et al., 2012) [24]. Small and large firms setting up or expanding do not have access to industrial land equipped with utilities and transport linkages to markets; they also lack land to use as collateral to secure loans. To facilitate growth in manufacturing in SSA, the issue of secure access to land must therefore be tackled head-on. Finally, sound land policies are required to protect natural resources and the environment against irrational use and pollution. The recent challenges of climate change and the upsurge in investor interest in African agriculture and natural resources make this even more urgent.

The previous paragraphs suggest that agricultural land rights are a key factor for sustainable agricultural development and lead to the hypothesis that agricultural economic profitability strongly depends on land tenure security. They reveal the importance of land security through land ownership that can enable credit access as a substitute for insurance to smooth consumption seasonally and over longer cycles for poor people. The same credit-accessing landownership enables financing of lumpy, indivisible, or long gestation investments for poor people. Indeed, cross-, and intercountry studies have empirically confirmed the potential of better access to real property (land) to enhance growth and reduce poverty. Therefore, it is a critical research issue to assess the impact of insecure land tenure on sustainable agriculture in Africa and to demonstrate how agricultural economic profitability strongly depends on land tenure security. Within the context of poor land administration (Ekpodessi and Nakamura, 2018) [25] that has long characterized many African countries, among which the Republic of Benin remains a tangible illustration, the case of Benin is worth investigating as Benin's land sector has only recently been reorganized toward achieving sustainable development. The importance of land in development in Benin is underlined by the fact that approximately 60% of the population derives its livelihood and income mainly from farming, livestock production, and related activities. In 2013, the Benin land law 2013-01 was enacted to reorganize Benin's land sector which has suffered from inappropriate management since the colonial period (Ekpodessi and Nakamura, 2018) [25]. Despite this, land use and landscape structures in Benin keep facing serious challenges including rapid population growth and pressure on land resources; agriculture expansion; urban sprawl; climate change, etc.

Benin is in the West African tropical zone between the equator and the Tropic of Cancer (between parallels 6′–30′ and 12′–30′ north latitude and meridians 1 and 30′–40′ east longitude). In 2014, this coastal country had a population of 10 million and a per capita annual income of USD 820. Benin's agricultural sector accounts for 32% of its GDP and employs approximately 70% of the workforce. Benin's annual GDP growth averaged 4% between 1996 and 2006, peaked at about 5% in 2008, and retracted to 2% in 2009 because of the global recession (World Bank Report, 2015) [26]. In terms of human development indicators, Benin ranks low: 161 of 182 countries (UNDP Human Development Report, 2009) [27]. The environmental performance index ranks the environmental sustainability performance of a country relative to other countries. Benin was ranked 163 out of 188 on the 2018 Human Development Index (HDI) ranking of the United Nations Development Program (UNDP) (Benin, Oxfam International, 2022) [28] reflecting its weak capacity to preserve the quality of its natural resources and ensure its population's well-being. In northern Benin, much of the Pendjari Plain and the Northern Pénéplaine bénino-togolaise Plain have been spared from landscape transformations owing to the complexity of the protected areas in the Eco region. Rainfed agricultural expansion is associated with the considerable fragmentation of Benin's remaining savannas which range from open tree savannas in the north to wooded savannas in the south. Even though the savanna area decreased by 23 % since 1975, it remains the dominant land cover type in Benin and still

covers more than half of the country. This study focuses on two communities from the savanna of northern Benin: Tchaourou and N'Dali, (Figure 1). Tchaourou is bordered to the north by the Parakou Commons Perere and N'Dali, south by the Municipality of Ouèssè, to the east by Nigeria, and to the west by the municipalities of Bassila and Djougou. It covers an area of 7256 sq km. The town N'Dali is limited by the municipalities of Bembèrèkè and Sinendé to the North, Parakou, and Tchaourou to the South, N'Dali in the East, Djougou, and Péhunco to the West. It covers an area of 3748 sq km. The study area is characterized by a multitude of ethnic groups, the most dominant of which are the Bariba and Peulhs, and agricultural production, especially cashew crops, remains their major source of income.



Figure 1. Location of the study area.

The present study aims to assess the impact of insecure land tenure on sustainable agriculture to demonstrate how agricultural economic profitability strongly depends on land tenure security. A sample group of farmers were surveyed, and a variety of data were collected to present a clear idea of the perception that the safer the farmland, the highest productivity. Through an interview of landowners and presumed owners combined with standardized observations in designated rural areas, issues related to the use and management of rural lands were highlighted. The outcome enables the assessment of the profitability of agricultural land and provides a basis for discussion and examination of key issues on the land question.

2. Materials and Methods

Four villages: Gbéyèkèrou and Guinirou of the commune Tchaourou, Sirarou, and Ouénou of the commune N'Dali, were investigated in the two communities of the study area because of their large number of farmers. Therefore, 102 farmers, mainly cashew and cotton farmers, among which 20 landowners and 82 presumed owners were the subjects of an investigation through an interview survey (Table 1). The above-mentioned landowners and presumed owners were identified in regard to land law 2013-01, which defines the various types of landownerships (Ekpodessi and Nakamura, 2018) [25]. The sample was selected in a simple random order to ensure fairness in survey participation and the information was collected based on a questionnaire sheet (Table 2). To assess the land property rights of the investigated farm, the study considered the new land law 2013-01 of

14 August 2013 in its Chapter 1, Article 112, which stipulates that "land certificates/titles are the only legal documents that give the holder full private ownership of a plot of land." To this extent, the study recognized the farmers as *landowners* if they were able to exhibit an official land certificate or registered land document and assumed *presumed landowners* were those farmers who exerted a certain right of production on certain plots of land but could not provide an official land property document. These presumed landowners are divided into two sub-categories: the *land inheritors* and further the *contract* farmers. Table 1 summarizes the characteristics and particularities of the respondents while Table 2 presents an outline of the questionnaire.

Table 1. Characteristics of the respondents.

Name of Communes	Name of Villages	Field of Production	Number of Respondents from Each Category				
			Landowners (with a Land Property Certificate)	Presumed Landowners (without a Land Property Certificate)		Sub-Total	Total
				Land Inheritors	Land Contracting Farmers		
Tchaourou	Gbéyèkèrou	Cashew	9	5	10	24	61
	Guinirou		6	6	25	37	
N'Dali	Sirarou	Cotton	3	17	8	28	41
	Ouénou		2	2	9	13	
TOTAL			20	30	52	102	102

Table 2. Sample of the survey sheet.

Date of investigation	Name of the commune	Name of village				
Farmer's information	Cultivated land size	Land ownership				
ECONOMIC IMPORTANCE OF PRODUCTION-COLLECTED DATA						
Profitability indicators	Variables of the profitability	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020
Gross Product Value (GPV)	Amount of harvest (Q)					
	Kilogram selling price (UP)					
	Calculated GPV					
Added Value (AV)	Intermediate Consumption (IC)					
	Calculated AV					
Gross Operating Income(GOI)	Labor compensation					
	Financial expenses					
	Tax					
	Calculated GOI					
Net Operating Income (NOI).	Value of depreciation					
	Calculated NOI					

The collected data from the questionnaire are related to the features of the expenditure and revenue of production of the farmers to assess the economic importance of their agricultural production for a period of five years from 2015 to 2020. Inspired by the work of Dédéwanou (2021) [29], we calculated profitability indicators such as Gross Product Value (GPV), Added Value (AV), Gross Operating Income (GOI), and Net Operating Income (NOI), which are explained below.

GPV is calculated using the following formula: GPV = Q × UP where Q designates the amount of harvest and UP indicates the kilogram selling price. The GPV is for this purpose the revenue made by the farmer. The AV is obtained by calculating the difference between the GPV and the value of Intermediate Consumption (IC) (charges related to the acquisition of insecticides, herbicides, jute bags, and all other expenses directly related to

the production). It is calculated using the formula: AV = GPV − C. It is the wealth that the farmer creates which affects the country's GDP.

The GOI was calculated here considering the hired labor. It is calculated by deducting labor compensation, financial expenses, and taxes from the Added Value as follows: GOI = AV − (Labor compensation + financial expenses + taxes). The NOI expresses the farmers' economic gains (or losses) after all operating expenses have been paid. It is obtained by deducting all the expenses related to the production (Value of Depreciation) from the GPV. It represents the balance of GOI minus the Value of Depreciation. It is calculated using the following formula: NOI = GOI − Value of Depreciation.

3. Results

Overall, the survey revealed very few numbers of secure land tenure in the study area. Regarding the land law 2013-01 of 14 August 2013, only 20 farmers (corresponding to 19.6% of the 102 that were studied), own a land property certificate. The remaining 82 farmers were classified into two groups: those who own land by *inheritance* (30 corresponding to 29.4%); and those who own land by *contract* (52 corresponding to 51%). In other words, 80.4% of the surveyed farmers do not have secured land according to the new land regulation. The survey also highlighted land contract farming as an effective solution developed by farmers to meet agricultural challenges among which land challenges remain one of the biggest. Table 3 describes indicators for assessing the investigated land security/insecurity. According to the records of the survey, 35 cashew farmers and 17 cotton farmers making a total of 52 farmers (corresponding to 51% of the total number of investigated farmers) have adopted land contract farming.

Table 3. Assessing farmland security/insecurity.

Ownership Type of the Surveyed Lands	Number by Land Type	Characteristics of the Surveyed Lands			
		Security Indicators	Vulnerability Indicators		
	Number	Land Registration	Dispute on Compensation	Carelessness of Land Rights	Dispute on Land Rights
Land with official property right	20	20	-	-	-
Land owned by inheritance	30	-	-	25	5
Land owned by contract	52	-	39	13	-
Total	102	20	39	38	5
Secured lands		20	-	-	-
Unsecured lands				82	

With agricultural land contracts, the original landholder earns a certain percentage of the annual NOI as compensation for providing the land. This percentage is defined in advance by the two parties to the contract. In the present case study, the compensation was approximately 1.5–2.0% of the NOI. However, the result indicates that the above-described practice strongly affects agriculture profitability, and indicators such as GVP, AV, GOI, and NOI are deemed to be subject to fluctuation depending on the type of land. To illustrate the trend, Tables 4–7 show the data access to the profitability indicators for each type of land.

Table 4. Data distribution of GPV values for each type of land.

Ownership Type of the Surveyed Lands	% of Respondents for GPV Value of 3.0–4.0	% of Respondents for GPV Value of 4.0–5.0	% of Respondents for GPV Value of 5.0–6.0	% of Respondents for GPV Value of 6.0–7.0	% of Respondents for GPV Value of 7.0–8.0	% of Respondents for GPV Value of 8.0–9.0	% of Respondents for GPV Value of 9.0–10.0
Land with official property right	0	0	0	15	20	45	20
land owned by inheritance	15	25	60	0	0	0	0
Land owned by contract	100	0	0	0	0	0	0

Table 5. Data distribution of AV values for each type of land.

Ownership Type of the Surveyed Lands	% of Respondents for AV Value of 2.0–3.0	% of Respondents for AV Value of 3.0–4.0	% of Respondents for AV Value of 4.0–5.0	% of Respondents for AV Value of 5.0–6.0	% of Respondents for AV Value of 6.0–7.0	% of Respondents for AV Value of 7.0–8.0
Land with official property right	0	0	0		45	55
land owned by inheritance	0	10	0	90	0	0
Land owned by contract	0	100	0	0	0	0

Table 6. Data distribution of GOI values for each type of land.

Ownership Type of the Surveyed Lands	% of Respondents for GOI Value of 1.0–2.0	% of Respondents for GOI Value of 2.0–3.0	% of Respondents for GOI Value of 3.0–4.0	% of Respondents for GOI Value of 4.0–5.0
Land with official property right	0	0	40	60
land owned by ingheritance	0	100	0	0
Land owned by contract	100	0	0	0

Table 7. Data distribution of NOI values for each type of land.

Ownership Type of the Surveyed Lands	% of Respondents for NOI Value of 1.0–2.0	% of Respondents for NOI Value of 2.0–3.0	% of Respondents for NOI Value of 3.0–4.0	% of Respondents for NOI Value of 4.0–5.0
Land with official property right	0	0	40	60
land owned by ingheritance	0	100	0	0
Land owned by contract	100	0	0	0

They reveal better indicator values for land with official property rights compared with inherited land or land owned by contract. Accordingly, contract farmers feel anxious about original landlords. Indeed, among the 52 contract farmers investigated, 39 (corresponding to 75%) were forced by their original landlords to increase the percentage of their compensation as the farmers' NOI increased yearly. The record indicates that none of the 30 inheritors of the interviewed farmers cared about securing their agricultural land as these lands have been occupied and exploited by their family members for years (more

than 30 years in most cases) and very few conflicts have occurred regarding land property rights, and the few which occurred were usually settled through friendly agreements. Five of the 30 inheritors of the cotton farmers who were investigated stated that when disputes involving land rights occurred, their production was forcefully interrupted for more than two years. The above-described issues are likely to put farmers in a condition of high vulnerability and these pose problems for the sustainability of agricultural production. One obvious consequence of this is the low economic profitability of the unsecured lands toward the profitability from the exploitation of secured lands over the five years investigated. Accordingly, the survey revealed that 80% of the investigated lands (the unsecured ones regarding the new regulations) obtained over five years the same average annual NOI with the remaining 20% of secured lands (corresponding to 50% of the total average annual NOI of 102 farmers). The annual average profitability based on the data relative to the expenditure and revenue of production by farmers is revealed in Table 4 which illustrates that the amount of money issued by land with official property rights (48%) borders on the total amounts of money issued by the combination of land owned by inheritance and land owned by contract (52%), both of which are deemed to be unsecured lands in accordance with the new regulations (Table 8).

Table 8. Assessing agricultural profitability for each type of land.

Plot of 1 Hectare Land Ownership	Average Annual GPV in Million CFA	Average Annual AV in Million CFA	Average Annual GOI in Million CFA	Average Annual NOI in Million CFA
Land with official property right	8.8	7.5	4.1	4
Land owned by inheritance	5.5	4.4	2.6	2.5
Land owned by contract	3.5	2.5	1.9	1.9
All lands	5.6	5.6	4.7	4.8

The survey revealed that the maximum GPV which is the farmers' revenue after harvesting was obtained by farmland owners with an official property right or at least a land registration certificate recognized by the land administration. The minimum GPV (3,635,000 CFA) was obtained by the land-contracting farmers and the maximum GPV (9,990,000 CFA) was obtained by those who owned land with official property rights. The maximum AV (7,855,000 CFA) and GOI (4,321,000 CFA) values were recorded from farms with official recognition and the minimum AV (2,332,000 CFA) and GOI (1,873,450 CFA) were recorded from land owned by contract. Overall, the highest NOI (4,278,455 CFA) is obtained by the *landowners*, followed by the *land inheritors* and the *contract farmers*. This can be explained by the fact that farmers who do not have full property rights to the land do not invest much money in unsecured land to avoid a high risk of loss. The above-described data prompt an assessment of the agriculture profitability trend regarding the type of land ownership. It shows that farming on secured land tends to be more profitable to farmers than farming on unsecured land. Accordingly, land with official property rights provides the highest average GPV (8.8 million CFA), the highest average AV (7.5 million CFA), the highest average GOI (4.1 million CFA), and NOI (4.0 million CFA) (Table 8). Figure 2 illustrates the trend of the average GPV from 2015 to 2020. It shows a rising line for land with official property rights, an almost horizontal line for land owned by inheritance, and a decreasing line for land owned by contract. In Benin, the agricultural sector is the mainstay of the economy occupies 48% of assets, and contributes over 32% to the GDP (MAEP, 2017); thus, it is necessary to take steps to ensure sustainable agricultural development.

Plot of 1 hectare Land ownership	Average Annual GPV 2015 in million CFA	Average Annual GPV 2016 in million CFA	Average Annual GPV 2017 in million CFA	Average Annual GPV 2018 in million CFA	Average Annual GPV 2019 in million CFA	Average Annual GPV 2020 in million CFA
Land with official property right	8.2	8.3	8.6	8.8	8.9	9.8
Land owned by inheritance	5.4	5.6	5.5	5.7	5.3	5.5
Land owned by contract	4	3.8	3.6	3.5	3.4	3.1

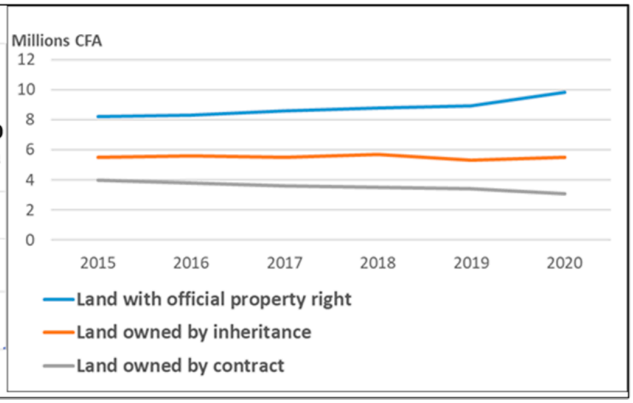


Figure 2. Trend of the average GPV from 2015 to 2020.

4. Discussion

It is worth noting that as far as we investigated, none of the previous research has addressed the land tenure security aspect of sustainable agriculture. Most of them have been focusing on agricultural land size. However, the results of this study align with the approach to agricultural sustainability assessments of the World Bank's Framework for the Evaluation of Sustainable Land Management, which identifies five pillars of land management leading to agriculture sustainability: productivity, security, protection, viability, and acceptability (Rogers and Rao, 2006) [30]. Accordingly, land security refers to the right attached to ownership of a plot of land by recognition of the land administration while protection refers to the respect of environmental measures against land soil pollution due to the abusive exploitation of the land. However, most of the FAO's reports focus more on the conservation of natural resources, including land, water, plants, and animals as key issues to be addressed in pursuance of sustainable agriculture development. Moreover, many studies focus on farmland scales toward agricultural productivity rather than farmland security (including land property rights, recognition by land administration, or land ownership in general). Studies by Barraclough 1970) [4]; Berry and Cline (1979) [5]; Kutcher and Scandizzo (1981) [6]; Barrett (1996) [7]; Benjamin and Brandt (2002) [8]; and Binswanger, Deininger, and Feder (1995) [9] focus on the land redistribution from wage-operated large farms to family run small farms to demonstrate the extent to which this may lead to increases in productivity, are tangible illustrations. Hill (1972) [10]; Kevane (1996) [11]; and Zaibet and Dunn (1998) [12] are no exceptions to the trend although their studies focus more on evidence of the inverse relationship between farmland scales and productivity as described by other studies. As for Collier and Dercon (2009) [13]; Barrett, Bellemare, and Hou (2010) [14]; Larson et al. (2012) [15]; and Carletto, Savastano, and Zezza (2013) [16], their research focused more on the quality of land and statistical issues rather than on land security toward agricultural sustainability. Considering the above, the present study's focus on land tenure security and land ownership appears as a contribution to the literature in the field of sustainable agriculture while most empirical research findings are mainly useful in indicating the relevant scale for the desired level of productivity.

While discussing with the farmers to clarify issues that affect their land ownership and compromise their productivity, we understood the extent to which land ownership patterns need to coincide with the patterns of actual land use by farmers. However, even in cases where land ownership patterns coincide with the patterns of actual land use by farmers, adjustments may be necessary to ensure more fair access to land resources, with the specific aim of eradicating rural poverty. In such cases, the necessary adjustments need to be decided on and carried out in a consultative and participatory manner, on terms acceptable to all sides concerned. Regarding this point, it is also recognized that more fair access to land resources alone, does not eradicate rural poverty. Much more important is the productive and sustainable use of available land.

The survey revealed that private property rights are the cornerstone of family-owned and cultivated land, which in turn is the backbone of agricultural production. The investigated farmers' responses suggest that fundamental adjustments to land ownership patterns require a consultative and participatory process by all stakeholders which needs to be decided on and implemented on terms acceptable to all sides concerned. Such adjustments must not be done in a destabilizing manner and must not endanger the planning and investment at the farm and community levels. However, ownership remains only one of the options allowing access to productive resources. Land may be leased on fair and fair terms, allowing farmers to use the land in a viable, sustainable, and secure manner.

Therefore, regulatory frameworks should be established and functioning, transparent land markets should be set up. Resource-poor tenant farmers must possess enough negotiating power to ensure a fair outcome for themselves. Tenant farmers must have the assurance that they will not be indiscriminately evicted from the farmlands by the owners. Accordingly, the importance of land tenure security for sustainable agriculture is asserted by its own definition.

5. Conclusions

This study assesses the impact of insecure land tenure on sustainable agricultural development and reveals a set of land issues that make farmers highly vulnerable, resulting in them compromising sustainable agriculture. It highlights land contract farming as an effective solution developed by farmers to meet agricultural land challenges even though farmers sometimes feel unsafe when their original landlords tend to change the terms of unexpired land contracts. Furthermore, land inheritance appears as a trap that exposes agricultural production to a sudden stop when conflict or misunderstanding occurs among inheritors.

The study reveals land security as a key factor for sustainable agricultural development toward poverty reduction and reiterates the unbreakable link between land security, agricultural production, and sustainable development. The result demonstrates that agricultural economic profitability strongly depends on land security: if tenant farmers are assured that they will not be indiscriminately evicted from the farmlands by the owners, their agricultural production will increase and they will contribute more to the GDP and export earnings, leading to a tangible reduction in poverty.

However, the few numbers of farmers and farms surveyed, the unavailability of accurate detailed data and information on the farmers' revenue, and the conditions of the farms for over five years, remain limitations that might slightly but not deeply impact the overall result of the study. Thus, this study suggests that further issues should be addressed to support sustainable agriculture with the specific aim of eradicating rural poverty. Accordingly, adjustments through land reform, fair tenancy arrangements, and fair access to land resources are necessary.

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